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ORIGINAL ARTICLES

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## Maternal mortality at Queen Elizabeth Central Hospital, 1989 to 1990

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### Introduction

Each year more than 500,000 women worldwide die in pregnancy and childbirth. Africa alone with less than 10% of the world population accounts for 150,000 maternal deaths, or 30% of the annual toll. The maternal mortality ratio expressed as the number of maternal deaths per 100,000 live births is for all of Africa estimated at 640 and varies from 100 to over 1000 in different regions, countries and urban or rural areas. Compared to the maternal mortality ratio of 10 to 20 in many developed countries this represents a 10-fold to 100-fold increase. Since these facts finally received attention in the late eighties<sup>1,2,3</sup> the international health community has been mobilized to improve maternal health and reduce pregnancy-related mortality in developing countries. These efforts received a strong impulse from the Safe Motherhood Initiative, resulting from the Safe Motherhood Conference sponsored by WHO, World Bank and UNFPA and held in Nairobi, Kenya, in 1987.

Earlier studies on maternal mortality in Malawi were published by Bullough in 1981<sup>4</sup> on maternal deaths in the Central Region and by Keller in 1987<sup>5</sup> on maternal deaths at Kamuzu Central Hospital in 1985.

In this paper the results are presented of an analysis of maternal deaths at Queen Elizabeth Central Hospital, Blantyre, in 1989 and 1990. The purpose of the study was to determine causes of death, analyse avoidable factors and look for ways to reduce mortality.

### Methods

Records of all maternal deaths at the Chatinkha Maternity Wing of QECH in 1989 and 1990 were reviewed. The files of 1990 were complete. In 1989 several records were missing and the information was then obtained from death books and nursing records kept on each ward. Death files of the female medical and surgical wards were scanned for patients with a pregnancy reported at the time of death or during the preceding 42 days.

In 1990 files were completed immediately after the patient's death and missing laboratory and other test reports collected. This was an improvement over the retrospective data collection in 1989 when files were reviewed only at the end of the year, resulting in many incomplete records and cases in which a cause of death no longer could be determined.

If any maternal deaths are missing from this report, it is despite our efforts to be as complete as possible.

### Results

A maternal death is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of its site or duration (WHO).

Direct obstetric deaths are those resulting from complications of pregnancy, delivery or their management, while indirect obstetric deaths are due to existing or new medical conditions, which are aggravated by pregnancy or delivery. For practical purposes all pregnant women who died of a medical condition were counted as indirect obstetric deaths, since it is often difficult to establish if a medical condition is actually affected by the pregnancy. Fortuitous deaths are unrelated to pregnancy and are usually due to accidents. There were none in the study.

The hospital maternal mortality ratio is the number of maternal deaths per 100,000 live births tak-

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ing place in the hospital during the same time interval.

In 1989 there were 78 maternal deaths, including 10 on the medical and surgical wards, for 14,272 live births, or a maternal mortality ratio of 546.

In 1990 there were 73 deaths, also including 10 from other wards, and 14,281 live births, or 511 maternal deaths per 100,000 live births.

Maternal mortality related to referral status and fetal outcome are presented in Table 1.

Table 1 Maternal Mortality, QECH (1989 and 1990)

	1989	1990
<b>REFERRED FROM:</b>		
Home	33	40
Hospital	19	17
Health Centre	18	14
Antenatal Clinic	0	2
Unknown	8	0
<b>TOTAL</b>	<b>78</b>	<b>73</b>
<b>FETAL OUTCOME</b>		
Abortion	19	19
Ectopic	1	1
Undelivered	8	15
Stillbirth	15	6
Neonatal Death	4	4
Live Birth	27	28
Unknown	7	0
<b>TOTAL</b>	<b>81</b>	<b>73</b>

#### CAUSES: DIRECT MATERNAL DEATHS

Causes of direct obstetric deaths are listed in Table 2. In each year there were 37, with the leading two causes in 1990 the reverse of those in 1989. In order to find an explanation for the significant increase in deaths from puerperal sepsis in 1990, these cases were reviewed in greater detail. Of the 13 patients 2 delivered at home, 4 at QECH, while 7 were referred from 6 different district hospitals one to 8 weeks after delivery. Despite a time interval of more than 42 days between delivery and death in 4 cases all were included, because of the presumed link between death and pregnancy. Of the two patients who had home deliveries, one was admitted with peritonitis and symptoms of HIV infection. She was severely wasted, had generalized lymphadenopathy and was HIV+. She died shortly before a scheduled laparotomy. The second patient proved to have a ruptured tubo-ovarian abscess, one week post partum. She underwent two laparotomies, but eventually died of septicaemia.

Table 2 Causes of direct maternal deaths, QECH (1989 and 1990)

	1989	1990
Puerperal Sepsis	6	13
after vaginal delivery	(4)	(8)
after caesarean section	(2)	(5)
Post-Abortal Sepsis	15	10
abortion induced	(12)	(8)
Anaemia	2	5
Obstructed Labour	8	2
with ruptured uterus	(5)	(2)
with intact uterus	(3)	(0)
Eclampsia	2	2
Postpartum Haemorrhage	2	4
Ectopic Pregnancy	1	1
Hydatidiform mole	1	0
<b>TOTAL</b>	<b>37</b>	<b>37</b>

Of the 4 patients who delivered at QECH, 2 developed peritonitis, 5 and 10 days after caesarean section and vaginal delivery. Unfortunately in both cases there was a delay in making the diagnosis. One patient expired during emergency laparotomy, while in the other a post-mortem paracentesis proved purulent peritonitis. A third patient was readmitted 10 weeks after delivery with chronic peritonitis and signs and symptoms of HIV infection, confirmed by a positive HIV antibody-test. She was emaciated, had oral thrush and suffered from severe anaemia and leukopenia and died shortly after admission. The fourth patient was readmitted, 3 weeks after uneventful delivery, with peritonitis. At laparotomy she proved to have a uterine fundal perforation, which remained unexplained. Two weeks later she died from septicaemia, despite initial recovery.

The 7 patients referred from other hospitals were severely ill and had signs of acute or chronic peritonitis on admission. All seven underwent a laparotomy, but died eventually. Of this group 6 were HIV+.

Of the 13 patients in 1990 with puerperal sepsis 8 had an HIV antibody test and all proved to be seropositive. The test was often but not always done when patients had symptoms of HIV infection or when they showed a poor response to treatment. It is our impression that the increase in morbidity and mortality from puerperal sepsis may be related to the increased incidence of HIV infection in pregnant women.

It should also be pointed out that with a caesarean section rate of 6.5%, the risk of dying from puerperal sepsis after this procedure is 8.5 times greater than after vaginal delivery.

Post-abortion sepsis remains an important cause of death, especially after illegal abortion. Of the 2100 evacuations in 1990 there were an estimated

100 cases of induced abortion. With 8 deaths the mortality rate could thus be as high as 8%.

Anaemia was the primary cause of death of 7 patients during the past two years. Missed diagnosis antenatally and lack of blood for transfusion were contributing factors in all cases.

Obstructed labour is still a major cause of maternal morbidity with 25 ruptured uteri during each of the past two years. Puerperal sepsis and vesicovaginal fistulae were other less frequent complications. Fortunately the number of maternal deaths, usually from sepsis or haemorrhage secondary to obstructed labour with or without ruptured uterus, has been decreasing recently, from 8 deaths in 1989 to 2 in 1990.

Of the 4 patients who died with eclampsia, 3 had minimal or no prenatal care, while the fourth patient attended clinic regularly, but developed symptoms very acutely. Only one was primigravida. All were admitted in coma from which none recovered.

While there were no deaths from antepartum haemorrhage, 6 patients died from bleeding postpartum. Four women were of high parity, over 35 years of age. Two, in their forties, para 10 and 12, underwent a laparotomy with hysterectomy and internal iliac artery ligation for uterine atony, unresponsive to conservative treatment. They died from haemorrhage complicated by coagulopathy. The other two patients died on their way to the hospital after home delivery followed by heavy bleeding in the third stage. The remaining two patients, who were young and of low parity, died from bleeding after caesarean section. One had uterine atony on the day of operation, while the other patient was referred without donors with secondary postpartum haemorrhage 2 weeks after surgery. Their deaths could have been prevented with timely diagnosis, aggressive medical treatment and blood available for transfusion.

Ectopic pregnancy caused one death each year. In one patient the diagnosis was missed, while the other died of septicaemia. At laparotomy several days earlier she proved to have an infected tubal pregnancy. In 1990 82 laparotomies were performed for ectopic pregnancies.

#### CAUSES: INDIRECT MATERNAL DEATHS

In this category there were 41 deaths in 1989 and 36 in 1990 (Table 3). In 1990 for the first time HIV infection had a major impact on pattern of disease and causes of death. This is not only reflected in patients who died of AIDS but in deaths from other, non-opportunistic infections as well. Of the 8 patients who died of bacterial meningitis 5 had an HIV antibody test and all proved to be seropositive. They had a fulminant course of disease and

most died within 24 hours of admission despite early treatment. All patients who died with pulmonary tuberculosis or septicaemia were HIV+.

Other causes of death were relatively infrequent. One patient died of tetanus one week after she was delivered by the roadside and referred with retained placenta. Her death occurred despite prenatal vaccination and was probably due to overwhelming infection.

Without autopsies, which are usually only carried out for medico-legal reasons, the cause of death of some patients could not be established.

Table 3 Causes of indirect maternal deaths, QECH (1989 and 1990)

	1989	1990
Bacterial Meningitis	5	8
AIDS	0	6
Kaposi's sarcoma	(0)	(2)
wasting, anaemia	(0)	(4)
Pulmonary Tuberculosis	0	4
Pneumonia	4	0
Septicaemia	0	3
Heart Failure	4	2
Fever, Cause Unknown	8	2
Surgical Problem	3	2
Cerebral Malaria	0	1
Hepatic Failure	1	0
Local Drug Intoxication	1	0
Tetanus	0	1
Unknown	15	7
TOTAL	41	36

#### AVOIDABLE FACTORS

A maternal death is often the result of a sequence of events comprising one or several avoidable factors. They can be divided into patient-related and health services-related factors, as presented in Table 4. Only the principal ones are listed. The assignment has of necessity a subjective element to it, as may be explained by the following example of a para 12 who received no prenatal care, delivered at home, had a postpartum haemorrhage, was unable to get transport in time and died an hour after arrival in the hospital, where screened blood for transfusion was not available. It is easy to see how one can argue that each of at least 4 avoidable factors is the principal one. What matters most however is that this death was entirely avoidable.

Pregnancy interference refers to illegal abortion. Contraindication to pregnancy existed in two patients who underwent cardiac valve replacement in South Africa and were advised to use contraception. It was unclear if they received any instruction on appropriate methods, since both became pregnant within a year of operation. One survived a septic abortion, complicated by a stroke, only to

return two weeks later with irreversible heart failure.

Patients' delay to report to the hospital was common but the reasons were often unclear, and relatives were usually not questioned about it after the patient had expired. Deficient hospital care pertained to delay in diagnosis, late or inappropriate treatment, lack of blood for transfusion or a combination of these.

Transport problems were rarely the main responsible factor for a patient's death in the hospital. However, for those ill patients who die at home or at a health centre before reaching the hospital, transport difficulties are probably the major culprit.

In 1990, 30 of 73 deaths (41%) were avoidable, compared to 44 of 78 (56%) in 1989. If cases with uncertain avoidable factors were excluded, 33 of 73 deaths (45%) were unavoidable in 1990, compared to 16 of 78 (21%) in 1989. The improvement is at least in part due to better hospital care.

*Table 4 Principal avoidable factors for maternal deaths, QECH (1989 and 1990)*

	1989	1990
Pregnancy Interference	10	8
Pregnancy Contraindicated	2	0
Patients' Delay	12	10
Transport Problems	1	1
Delayed Referral to Hospital	1	2
Deficient Hospital Care	18	9
Uncertain	18	10
None	16	33
TOTAL	78	73

## Discussion

Maternal mortality data are notoriously unreliable and suffer from serious under-reporting. In 1989 no more than 18 deaths in the Blantyre district were reported to the Maternal and Child Health Office, while in QECH alone 78 deaths were counted.

On the other hand the hospital maternal mortality ratios of 546 in 1989 and 511 in 1990 probably overestimate the MMR of the population at large. One reason is that women who develop complications antenatally and during delivery are more likely to come to the hospital, while most normal deliveries take place somewhere else. Another reason is that in each of the two years almost 25% of deaths were referred from other district hospitals with complications after abortion or delivery. However the number of live births from which they were recruited in their districts was not

included in our statistics. This raises the MMR by increasing the numerator, without changing the denominator.

For comparison, Keller reported an MMR for Kamuzu Central Hospital of 712 in 1985<sup>5</sup>, similar to the ratio of 759 found by Driessen in 1989 (personal communication). This contrasts with the WHO estimate of 250 maternal deaths per 100,000 live births for Malawi and the MMR of 263 reported by Bullough for the Central Region<sup>4</sup>. This shows that comparisons between different populations are not very useful.

Leading causes of death remain puerperal sepsis, abortion, anaemia, haemorrhage, eclampsia and obstructed labour, in different order for each of the two years. Some complications were concentrated in two risk groups which are the very young and the older women of high parity. The first group suffered a high mortality from septic abortion, which was usually induced. The women of high parity in this study had high death rates from complications of anaemia, ruptured uterus and postpartum haemorrhage, while in general this group is at increased risk for most pregnancy complications.

A new risk group has now emerged of women who are HIV seropositive. They appear to have more severe antenatal and postpartum infectious complications, with a high mortality and more direct and indirect obstetric deaths than women who are seronegative. Cases of puerperal sepsis have increased significantly in these patients and if the present trend continues there could be a marked rise in mortality, which was already manifest in the first 3 months of 1991.

Antenatal clinic attendance in the district is high, with 97% of pregnant women presenting at least once. This is due to a network of health centres and maternities that in general function efficiently. Still several deaths occurred in women who never attended a clinic.

Guidelines for referrals to the hospital by peripheral units were usually followed well and in no instance could mismanagement or delay by any of these be blamed for a patient's death.

A measure for the impact of socioeconomic factors was the difference between mortality of patients on the paying wards, with 2 indirect, unavoidable deaths per 1228 live births, or an MMR of 163, compared to 71 deaths per 13,053 live births, resulting in an MMR of 544 on the non-paying wards, a 3.3 fold increase. Higher levels of education and income, better nutrition and less anaemia, greater use of child spacing methods, early recognition of complications with self-referral to a hospital are some of the patient related factors that contribute to the lower mortality of the paying

patients, while more staff to look after them in the hospital also acts in their favour.

Although the MMR was lower in 1990 than in 1989, the fact remains that an astoundingly high 41% (30/73) deaths were avoidable. On the part of the health services there is still much to be done to lower maternal deaths. Prevention of unwanted pregnancies mostly in young single women should become a priority. This requires education on responsible sexual behaviour and policy changes in the availability of contraceptives for young women and men. This is also urgently needed to prevent the further spread of HIV infection in this group.

The prevention of yet another pregnancy in older women of high parity is another goal. This could be achieved by making information on child spacing methods and sterilization available to them during antenatal care rather than after delivery. Our impression is that women who were counselled during pregnancy were more likely to use child spacing later on or request sterilization than those who were not informed antenatally.

At weekly departmental meetings all deaths are discussed and analyzed to determine where improvements can be made. However, a diagnosis can still be missed or treatment started too late, sometimes because blood or the appropriate drugs are not available. Shortages of nursing and medical staff on the overcrowded wards are a compounding problem, which affects the quality of care. Although fewer deaths can be attributed to deficient hospital care in 1990 than in the year before, there is little reason for complacency.

### Conclusion

About half of all maternal deaths were assessed to be avoidable. It is clear that much remains to be done to reach the goal of reducing maternal mortality by 50% by the year 2000 (WHO). Furthermore the spread of HIV infection could reverse any downward trends in maternal mortality rates. Prevention of the saddest of tragedies - the death of women and mothers during pregnancy and childbirth - is a priority goal and will require strengthening of health services at every level.

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